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THE LATE SIR HENRY DOULTON

From a drawing by
Frederick Sandys

A Brief Story of the Process of Manufacture of Bone China

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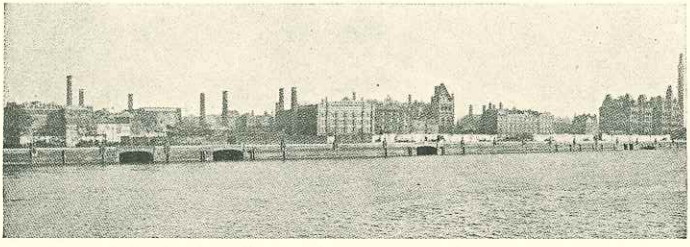

View of the Royal Doulton Lambeth Works, Lambeth, London, England

A Brief Story of the Process of Manufacture of Bone China

ENGLISH BONE CHINA is of the purest whiteness and translucency and is unique among all pottery products in that its translucency is secured without incorporating the glassy "brittleness" that is so characteristic of all other types of translucent pottery.

This unique property is the result of the use of calcined bone, a costly ingredient as extraordinary in its action as any used throughout all industry. The "toughness" of an ox shin-bone can be readily appreciated as compared with that of a rod of felspathic stone, and with expert handling this bone imparts its "toughness" to the pottery of which it is so largely composed. Further, although it is in itself one of the most refractory materials, when mixed wtih a carefully calculated percentage of silica at a given temperature, a chemical reaction takes place that results in the formation of a flux.

The ingredients of Royal Doulton Bone China are almost exactly as follows—

50% Calcined Bone-ash, all of which is exclusively picked from selected shin-bones and knuckles (all other bones being less strong and tough are strictly discarded).

30% of Cornish Stone.

20% of China Clay.

With regard to these ingredients, it goes without

saying that the China Clay used is the purest procurable, and represents the final "settlings" from the overflow of four separate washings.

Cornish Stone has the unique property among all alkaline and vitreous rocks of retaining the "toughness" of the granite rock from which it has been gradually washed and deposited in the valleys by the slow disintegration of countless ages.

The above contention of exceptional strength and toughness is one that cannot be too strongly stressed, and once stressed must inevitably carry conviction to even untrained minds. It is within the knowledge of everyone that a sledge-hammer blow on a block of felspathic rock would shatter it immediately into many fragments, whereas a similar lump of granite endures repeated such blows before it reluctantly parts into two pieces.

As stated above, of fully equal importance is the tough, dense, translucent flux produced by a suitable amalgam of bone-ash and silica as compared with the glassy, flaky, brittle flux inseparable from the use of alkaline felspars.

Once these ingredients are mixed in calculated proportions, they are blunged into a thin slip, which requires intensive and complicated purifying. This is accomplished by pumping it over three decks of rapidly agitated phospher-bronze lawns of such fineness in mesh that the eye is entirely unable to detect the cavities, and which in actual practice discard impurities which are undetectable to the eye. Even then, minute particles of iron may remain which, during firing, would stain the surrounding clay, and are essential to remove. These are extracted by electro magnets, and when we state that our magnets are so large as to involve

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more than a mile and a half of copper coil wire it will be realized that no expense has been spared to ensure the utmost purity of the final clay slip and complete freedom from any contamination however minute.

The purified slip is then stored in stock arks, in which it is allowed to progressively mellow and "age", and from which, after a suitable period, it is pumped under pressure through fixed press cloths until the requisite amount of excess moisture has been extracted, and the clay is in a plastic condition suitable for ideal handling and shaping by the potters.

The general methods of handling in the potters' shops are varied, but well-known, and need no explanation.

When we come to the first firing, that is, firing to the bisque state, the most delicate and sensitive operation of all the many processes of China production has to be faced. Hitherto (and today with all Bone China factories with the exception of Royal Doulton) this bisque firing has been accomplished in intermittent beehive ovens, though of special construction. A fine degree of control is solely in the hands of trained firemen who, with the frailty of all human control and judgment invariably get certain sections of the oven slightly ill-balanced with the remainder. This inevitably means that, in addition to direct loss, there is a percentage that is not quite equal to the best. For sometime we have had in continuous operation an entirely new type of continuous oven, specially designed for exactitude of control that, with careful and trained handling, operates through the whole 24 hours without a variation of more than

10 degrees centigrade throughout the whole cubic placing area. Consequently, not only are we aiming at perfect quality, but that all articles that are correctly made by the operatives shall be the equal of the best.

Not only is the peak temperature under rigid control, but the gradual increase of temperature throughout the very slow travel of the goods is equally controlled, with definite important improvements, in results and general evenness of density as compared with the more jerky rise in temperature inseparable from periodic coal "baitings".

Every China article is separately bedded in impalpably finely ground alumina, in order to retain its original form throughout the firing contraction, and this film of powdered alumina has then to be completely removed by mechanical friction and exhaust draught, prior to glazing.

Each piece is then separately immersed in the dipper's tub, and with *EACH* piece previously fired to *an exact temperature* it is clear that the glazing coat will not only be evenly applied throughout an hour's output but equally evenly throughout the output of months, always providing the consistency of the glaze is kept constant. Hitherto, slight differences of temperature in the bisque firing, resulting in a varying degree of absorption, have involved slightly varying thicknesses of glaze coating on different articles; to-day with a carefully graded and tested glaze mixing (all entirely leadless) rigidly maintained to a fixed consistency, it automatically follows that the task of

securing an even glazing throughout the whole year's output becomes for the first time possible of achievement.

Royal Doulton Bone China biscuitting is today done at 1270 degrees centigrade—not 1250 degrees, nor 1290 degrees—but the whole output at almost an exactly controlled temperature around 1270 degrees.

There has been erected on our plant a tunnel oven of entirely new design to be supplied with gas at a steady, even pressure provided by a mechanically controlled blast, and with each gas port under the control of independent delicate valves capable of being operated to a fraction of an inch. With this oven in operation, it is confidently contemplated that the control of the temperature of the glazing will be as complete as that of the biscuitting.

The decorations are almost as many and as varied as are the types of temperament of which humanity is composed. The least complicated of Fine China decorations involves three separate firings owing to the different temperatures required to melt the various metallic oxides of which the various colours are composed and the consequent necessity of building up the complete decoration in progressive stages with the colours requiring the greatest temperature applied first. The most complicated of our decorations are fired as many as ten times in the gradual assembly of the complicated colour palette involved. To-day, all these firings, without exception, are done in electrically controlled continuous kilns, in which the temperature control is *absolute*.

Among the recent achievements of Royal Doul-

ton is the production of Bone China in *Ivory Body* —not an Ivory glaze or ground color—but Ivory all through, giving a richness in decorative effects never surpassed.

The progressive scientific methods of production by Royal Doulton have established a Standard of excellence in quality and beauty never before equalled in Ceramic Industry.

The Pottery Experts of the world concede that English Bone China to-day stands on the same pedestal it has long occupied as the Aristocrat among all the classes of Pottery that are made.